

Solve Simultaneous Equation with Matrix Method / Cramer's Rule

Find the value of x and y that satisfy the following equation with

$$\begin{aligned}\frac{3}{4}x - y &= 2 & 3x - 4y &= 8 \\ 2x &= 5 + 2y & 2x - 2y &= 5\end{aligned}$$

Matrix method:

$$\begin{aligned}\begin{pmatrix} 3 & -4 \\ 2 & -2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} &= \begin{pmatrix} 8 \\ 5 \end{pmatrix} \\ \begin{pmatrix} x \\ y \end{pmatrix} &= \frac{1}{3(-2) - (-4)(2)} \begin{pmatrix} -2 & 4 \\ -2 & 3 \end{pmatrix} \begin{pmatrix} 8 \\ 5 \end{pmatrix} \\ \begin{pmatrix} x \\ y \end{pmatrix} &= \begin{pmatrix} 2 \\ -\frac{1}{2} \end{pmatrix} \\ x &= 2, y = -\frac{1}{2}\end{aligned}$$

Cramer's Rule:

$$\begin{aligned}x &= \frac{\begin{vmatrix} 8 & -4 \\ 5 & -2 \end{vmatrix}}{\begin{vmatrix} 3 & -4 \\ 2 & -2 \end{vmatrix}} = \frac{8(-2) - (-4)(5)}{3(-2) - (-4)(2)} = 2 \\ y &= \frac{\begin{vmatrix} 3 & 8 \\ 2 & 5 \end{vmatrix}}{\begin{vmatrix} 3 & -4 \\ 2 & -2 \end{vmatrix}} = \frac{3(5) - 8(2)}{3(-2) - (-4)(2)} = -\frac{1}{2}\end{aligned}$$